Operating Instructions

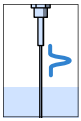
VEGAFLEX 67

-200 … +400 °C

Profibus PA

Document ID:
32313

Guided Microwave



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Supplementary documentation

Information:
Supplementary documents appropriate to the ordered version come with the delivery. You can find them listed in chapter "*Product description*".

Instructions manuals for accessories and replacement parts

Tip:
To ensure reliable setup and operation of your VEGAFLEX 67, we offer accessories and replacement parts. The corresponding documentations are:

- 27720 - VEGADIS 61
- 30207 - Electronics module VEGAFLEX series 60
- 34296 - Protective cover
- 31088 - Flanges according to DIN-EN-ASME-JIS-GOST
- 30391 - Spacer

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1 About this document

1.1 Function

This operating instructions manual provides all the information you need for mounting, connection and setup as well as important instructions for maintenance and fault rectification. Please read this information before putting the instrument into operation and keep this manual accessible in the immediate vicinity of the device.

1.2 Target group

This operating instructions manual is directed to trained qualified personnel. The contents of this manual should be made available to these personnel and put into practice by them.

1.3 Symbolism used

Information, tip, note
This symbol indicates helpful additional information.

Caution: If this warning is ignored, faults or malfunctions can result.
Warning: If this warning is ignored, injury to persons and/or serious damage to the instrument can result.
Danger: If this warning is ignored, serious injury to persons and/or destruction of the instrument can result.

Ex applications
This symbol indicates special instructions for Ex applications.

- **List**
  The dot set in front indicates a list with no implied sequence.

→ **Action**
This arrow indicates a single action.

1 **Sequence**
Numbers set in front indicate successive steps in a procedure.

2 For your safety

2.1 Authorised personnel

All operations described in this operating instructions manual must be carried out only by trained specialist personnel authorised by the plant operator.

During work on and with the device the required personal protective equipment must always be worn.

2.2 Appropriate use

VEGAFLEX 67 is a sensor for continuous interface measurement in liquids.

You can find detailed information on the application range in chapter "*Product description*".

Operational reliability is ensured only if the instrument is properly used according to the specifications in the operating instructions manual as well as possible supplementary instructions.

For safety and warranty reasons, any invasive work on the device beyond that described in the operating instructions manual may be carried out only by personnel authorised by the manufacturer. Arbitrary conversions or modifications are explicitly forbidden.

2.3 Warning about misuse

Inappropriate or incorrect use of the instrument can give rise to application-specific hazards, e.g. vessel overfill or damage to system components through incorrect mounting or adjustment.

2.4 General safety instructions

This is a high-tech instrument requiring the strict observance of standard regulations and guidelines. The user must take note of the safety instructions in this operating instructions manual, the country-specific installation standards as well as all prevailing safety regulations and accident prevention rules.

The instrument must only be operated in a technically flawless and reliable condition. The operator is responsible for trouble-free operation of the instrument.

During the entire duration of use, the user is obliged to determine the compliance of the necessary occupational safety measures with the current valid rules and regulations and also take note of new regulations.

2.5 CE conformity

This device fulfills the legal requirements of the applicable EC guidelines. By attaching the CE mark, VEGA provides a confirmation of successful testing. You can find the CE conformity declaration in the download area of "www.vega.com".

2.6 Fulfillment of NAMUR recommendations

The device fulfills the requirements of the applicable NAMUR recommendations.

2.7 Safety instructions for Ex areas

Please note the Ex-specific safety information for installation and operation in Ex areas. These safety instructions are part of the operating instructions manual and come with the Ex-approved instruments.

2.8 Environmental instructions

Protection of the environment is one of our most important duties. That is why we have introduced an environment management system with the goal of continuously improving company environmental protection. The environment management system is certified according to DIN EN ISO 14001.

Please help us fulfil this obligation by observing the environmental instructions in this manual:

- Chapter "*Packaging, transport and storage*"
- Chapter "*Disposal*"

3 Product description

3.1 Structure

Scope of delivery

The scope of delivery encompasses:

- Level sensor VEGAFLEX 67
- Documentation
  - this operating instructions manual
  - Operating instructions manual 27835 "*Indicating and adjustment module PLICSCOM*" (optional)
  - Supplementary instructions manual 31708 "*Heating for indicating and adjustment module*" (optional)
  - Supplementary instructions manual "*Plug connector for continuously measuring sensors*" (optional)
  - Ex-specific "*Safety instructions*" (with Ex versions)
  - if necessary, further certificates

Constituent parts

The VEGAFLEX 67 consists of the components:

- Process fitting with probe
- Housing with electronics
- Housing cover, optionally available with indicating and adjustment module

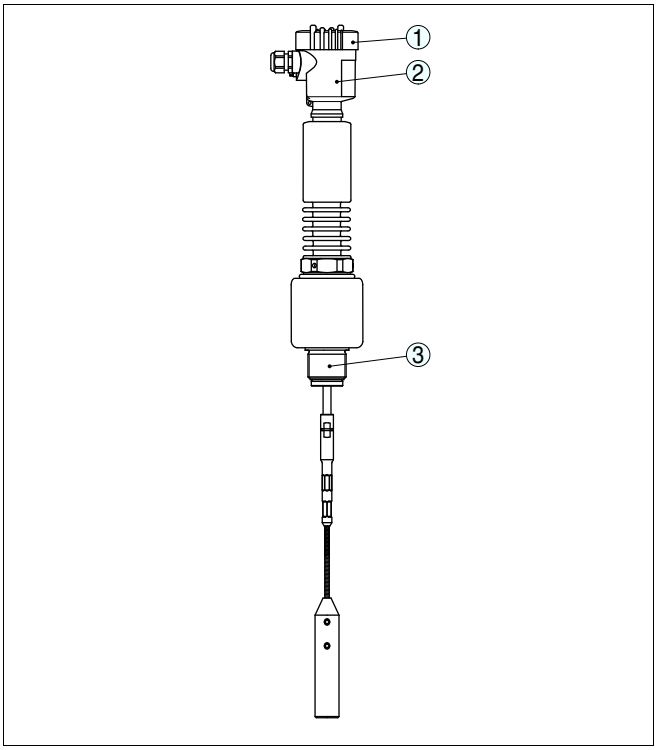


Fig. 1: VEGAFLEX 67 - cable version with plastic housing

1 Housing cover with integrated indicating and adjustment module (optional)
2 Housing with electronics
3 Process fitting

Type label

The type label contains the most important data for identification and use of the instrument:

- Article number
- Serial number
- Technical data
- Article numbers, documentation

With the serial number, you can access the delivery data of the instrument via www.vega.com, "*VEGA Tools*" and "*serial number search*". In addition to the type label outside, you can also find the serial number on the inside of the instrument.

3.2 Principle of operation

Application range

VEGAFLEX 67 is a level sensor with coax, rod or cable probe for continuous interface measurment.

It is designed for industrial use in all areas of process technology and can be used in liquids.

Functional principle

High frequency microwave impulses are guided along a steel cable or rod or a rod inside a steel tube. When reaching the product surface, a part of the microwave impulses is reflected. The other part passes the upper product and is reflected a second time by the interface. The running times to the two product layers are processed by the instrument.

Prerequisites for interface measurement

Upper medium (L2)

- The upper medium must not be conductive
- The dielectric figure of the upper medium must be known (input required). Min. dielectric figure: rod version 1.7; coax version 1.4. You can find a list with the dielectric figures on our home page: www.vega.com
- The composition of the upper medium must be stable, no varying products or mixtures
- The upper medium must be homogeneous, no stratifications within the medium
- Min. thickness of the upper medium 100 mm
- Clear separation from the lower medium, no emulsion phase, no mull layer
- If possible, no foam on the surface

Lower medium (L1)

- The dielectric figure must be 10 higher than the dielectric figure of the upper medium, preferably electrically conductive. Example: upper medium dielectric figure 2, lower medium at least dielectric figure 12

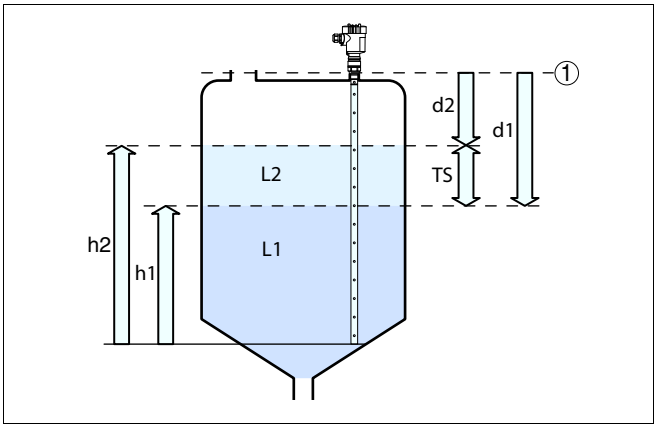


Fig. 2: Interface measurement

1 Reference plane
d1 Distance to the interface
d2 Distance to the level
TS Thickness of the upper medium (d1 - d2)
h1 Height - Interface
h2 Height - Level
L1 Lower medium
L2 Upper medium

Output signal

The interface is directly processed by the sensor and outputted as digital output signal.

The indication of the indicating and adjustment module and PACTware output the distance to the interface (d1) in m(d).

Power supply and bus communication

Power supply via the Profibus DP/PA segment coupler or VEGALOG 571 EP cards. A two-wire cable according to Profibus specification serves as carrier of both power and digital data transmission for multiple sensors. The instrument profile of VEGAFLEX 67 corresponds to profile specification version 3.0.

The backlight of the indicating and adjustment module is powered by the sensor. Prerequisite is a certain level of operating voltage.

The data for power supply are specified in chapter "*Technical data*".

The optional heating requires its own operating voltage. You can find details in the supplementary instructions manual "*Heating for indicating and adjustment module*".

This function is generally not available for approved instruments.

GSD/EDD

The GSD (instrument master files) and bitmap files necessary for planning your Profibus-DP-(PA) communication network are available from the download section on the VEGA homepage www.vega.com under "*Services - Downloads - Software - Profibus*". There you can

also find the appropriate certificates. In a PDM environment, an EDD (Electronic Device Description) is also required to enable the full range of sensor functions (also available as a download).A CD with the appropriate files can be ordered via e-mail under info@de.vega.com or by phone from one of the VEGA agencies under the order number "DRIVER.S".

3.3 Operation

The instrument can be adjusted with the following adjustment media:

- With indicating and adjustment module
- with the suitable VEGA DTM in conjunction with an adjustment software according to the FDT/DTM standard, e.g. PACTware and PC
- with the adjustment program PDM

3.4 Packaging, transport and storage

Packaging

Your instrument was protected by packaging during transport. Its capacity to handle normal loads during transport is assured by a test according to DIN EN 24180.

The packaging of standard instruments consists of environment-friendly, recyclable cardboard. For special versions, PE foam or PE foil is also used. Dispose of the packaging material via specialised recycling companies.

Transport

Transport must be carried out under consideration of the notes on the transport packaging. Nonobservance of these instructions can cause damage to the device.

Transport inspection

The delivery must be checked for completeness and possible transit damage immediately at receipt. Ascertained transit damage or concealed defects must be appropriately dealt with.

Storage

Up to the time of installation, the packages must be left closed and stored according to the orientation and storage markings on the outside.

Unless otherwise indicated, the packages must be stored only under the following conditions:

- Not in the open
- Dry and dust free
- Not exposed to corrosive media
- Protected against solar radiation
- Avoiding mechanical shock and vibration

Storage and transport temperature

- Storage and transport temperature see chapter "*Supplement - Technical data - Ambient conditions*"
- Relative humidity 20 … 85 %

4 Mounting

4.1 General instructions

Suitability for the process conditions

Make sure that all parts of the instrument exposed to the process, in particular the sensor element, process seal and process fitting, are suitable for the existing process conditions. These include above all the process pressure, process temperature as well as the chemical properties of the medium.

You can find the specifications in chapter "*Technical data*" and on the type label.

Mounting position

Select an installation position you can easily reach for mounting and connecting as well as later retrofitting of an indicating and adjustment module. The housing can be rotated by 330° without the use of any tools. You can also install the indicating and adjustment module in four different positions (each displaced by 90°).

Welding work

Before beginning the welding work, remove the electronics module from the sensor. By doing this, you avoid damage to the electronics through inductive coupling.

Handling

With threaded versions, the housing must not be used to screw in the instrument! Applying tightening forces on the housing can damage its internal parts.

Use the hexagon for screwing in.

Moisture

Use the recommended cables (see chapter "*Connecting to power supply*") and tighten the cable gland.

You can give your instrument additional protection against moisture penetration by leading the connection cable downward in front of the cable entry. Rain and condensation water can thus drain off. This applies mainly to outdoor mounting as well as installation in areas where high humidity is expected (e.g. through cleaning processes) or on cooled or heated vessels.

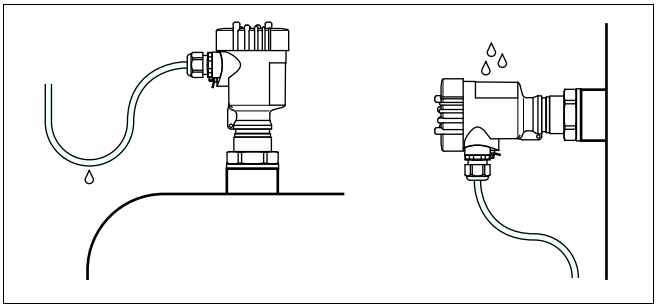


Fig. 3: Measures against moisture penetration

Measuring range

The reference plane for the measuring range of the sensors is the sealing surface of the thread or flange.

Keep in mind that a min. distance must be maintained below the reference plane and possibly also at the end of the probe - measurement in these areas is not possible (dead band). Particularly the cable length cannot be used all the way to the end because measurement in the area of the gravity weight is not possible. These dead bands are listed in chapter "*Technical data*". Keep in mind for the adjustment that the default setting for the measuring range refers to water.

Pressure

The process fitting must be sealed if there is gauge or low pressure in the vessel. Before use, check if the seal material is resistant against the measured product and the process temperature.

The max. permissible pressure is specified in chapter "*Technical data*" or on the type label of the sensor.

4.2 Instructions for installation

Mounting position

When mounting the cable and rod versions of VEGAFLEX 67 keep at least a distance of 300 mm (11.81 in) to other vessel installations or to the vessel wall.

During operation, the probe must not touch any installations or the vessel wall. If necessary, fasten the probe end.

In vessels with conical bottom it can be advantageous to mount the sensor in the center of the vessel, as measurement is then possible down to the lowest point of the bottom. When using the cable version,

keep in mind that measurement down to the tip of the probe is not possible. The exact value of the min. distance (lower dead band) is stated in chapter "*Technical data*".

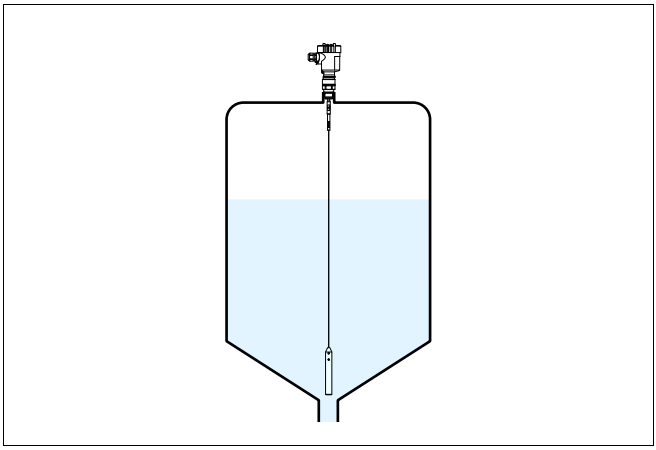


Fig. 4: Vessel with conical bottom

Inflowing medium

Make sure that the probe is not subjected to strong lateral forces. Mount VEGAFLEX 67 at a position in the vessel where no disturbances, e.g. from filling openings, agitators, etc., can occur.

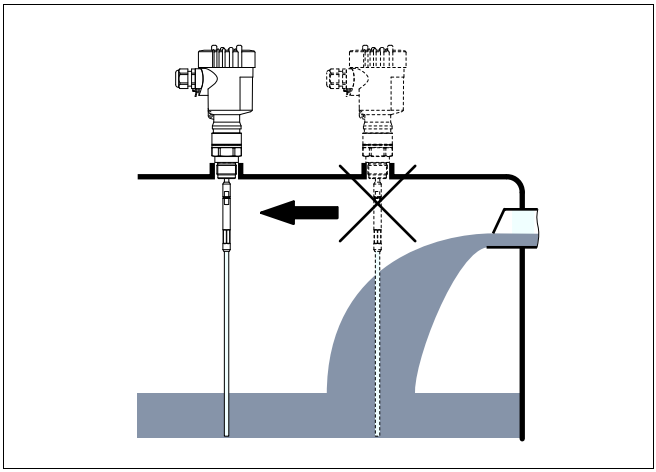


Fig. 5: Lateral load

Extreme vibration caused by the system, e.g. due to agitators or turbulence in the vessel from inflowing medium, can cause the coax probe of VEGAFLEX 67 to vibrate in resonance. With coax probes of

more than 1 m (3.281 in) length, you must secure the probe by fastening a suitable insulated brace or guy directly above the end of the rod.

Temperature insulation

VEGAFLEX 67 should be integrated in the vessel insulation. This prevents the electronics from strong heating or cooling by temperature radiation.

Make sure that with heated or cooled vessels the permissible ambient temperature on the housing is not exceeded. The permissible ambient temperature is stated in chapter "*Technical data*" under "*Ambient conditions*".

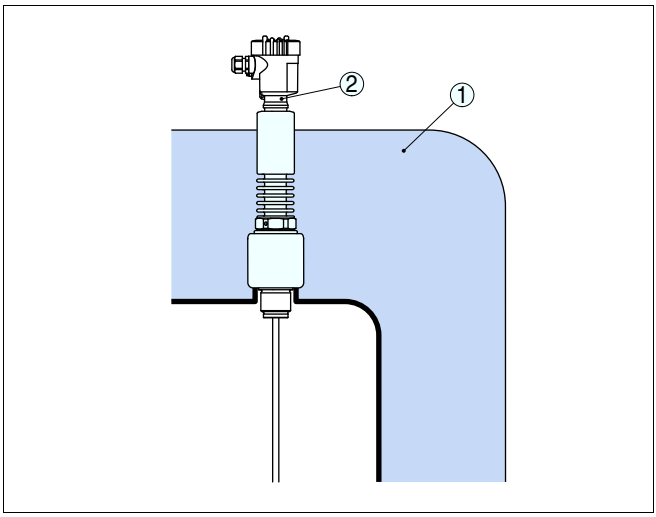


Fig. 6: Vessel with temperature insulation

1 Temperature insulation
2 Ambient temperature on the housing

5 Connecting to power supply

5.1 Preparing the connection

Safety instructions

Always keep in mind the following safety instructions:

- Connect only in the complete absence of line voltage
- If voltage surges are expected, overvoltage arresters should be installed according to Profibus specifications

Tip:
We recommend VEGA overvoltage arrester B63-32.

In hazardous areas you must take note of the respective regulations, conformity and type approval certificates of the sensors and power supply units.

Voltage supply

Power is supplied via a Profibus DP/PA segment coupler or a VEGALOG 571 EP input card. The power supply range can differ depending on the instrument version.

The data for power supply are specified in chapter "*Technical data*".

Connection cable

Connection is made with screened cable according to the Profibus specification. Power supply and digital bus signal are carried over the same two-wire connection cable.

Use cable with round cross-section. A cable outer diameter of 5 … 9 mm (0.2 … 0.35 in) ensures the seal effect of the cable gland. If you are using cable with a different diameter or cross-section, exchange the seal or use a suitable cable gland.

Please make sure that your installation is carried out according to the Profibus specification. In particular, make sure that the termination of the bus is done with appropriate terminating resistors.

Cable gland ½ NPT

On the instrument with cable entry ½ NPT and plastic housing there is a metallic ½" threaded insert moulded into the plastic housing.

Caution:
No grease should be used when screwing the NPT cable gland or steel tube into the threaded insert. Standard grease can contain additives that corrode the connection between threaded insert and housing. This would influence the stability of the connection and the tightness of the housing.

Cable screening and grounding

With systems with potential equalisation, connect the cable screen directly to ground potential at the power supply unit, in the connection box and at the sensor. The screen in the sensor must be connected directly to the internal ground terminal. The ground terminal outside on the housing must be connected to the potential equalisation (low impedance).

In systems without potential equalisation, connect the cable screen directly to ground potential at the power supply unit and at the sensor. In the connection box or T-distributor, the screen of the short stub to the sensor must not be connected to ground potential or to another cable screen. The cable screens to the power supply unit and to the next distributor must be connected to each other and also connected to ground potential via a ceramic capacitor (e.g. 1 nF, 1500 V). Low-frequency potential equalisation currents are thus suppressed, but the protective effect against high frequency interference signals remains.

The total capacitance of the cable and of all capacitors must not exceed 10 nF in Ex applications.

Take note of the corresponding installation regulations for Ex applications. In particular, make sure that no potential equalisation currents flow over the cable screen. In case of grounding on both sides this can be achieved by the use of a capacitor or a separate potential equalisation.

5.2 Connection procedure

Proceed as follows:

1 Unscrew the housing cover
2 If an indicating and adjustment module is installed, remove it by turning it to the left.
3 Loosen compression nut of the cable entry
4 Remove approx. 10 cm (4 in) of the cable mantle, strip approx. 1 cm (0.4 in) of insulation from the ends of the individual wires
5 Insert the cable into the sensor through the cable entry
6 Lift the opening levers of the terminals with a screwdriver (see following illustration)

7 Insert the wire ends into the open terminals according to the wiring plan

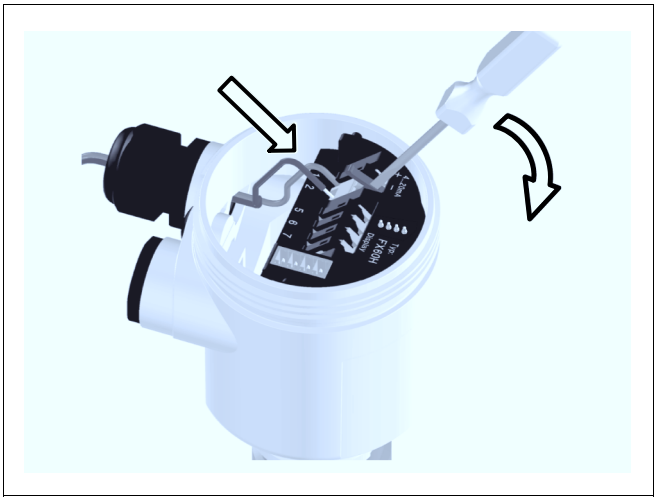


Fig. 7: Connection steps 6 and 7

8 Press down the opening levers of the terminals, you will hear the terminal spring closing

9 Check the hold of the wires in the terminals by lightly pulling on them

10 Connect the screen to the internal ground terminal, connect the outer ground terminal to potential equalisation

11 Tighten the compression nut of the cable entry. The seal ring must completely encircle the cable

12 Screw the housing cover back on

The electrical connection is finished.

5.3 Wiring plan, single chamber housing

The following illustrations apply to the non-Ex as well as to the Ex-ia version.

Electronics and connection compartment

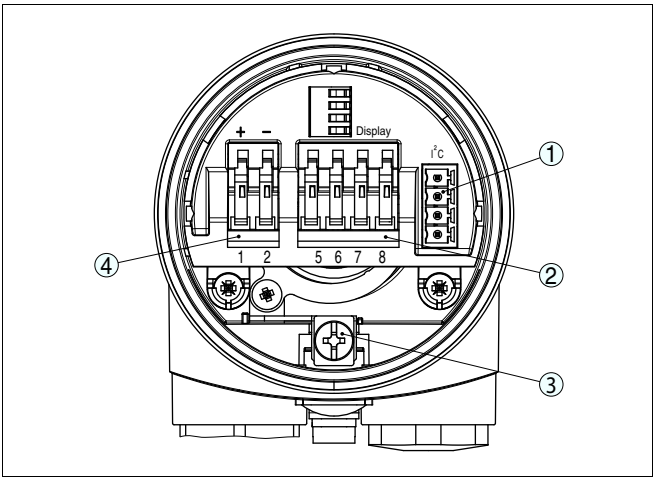


Fig. 8: Electronics and connection compartment, single chamber housing

1 *Plug connector for VEGACONNECT (I^2C interface)*
2 *Spring-loaded terminals for connection of the external indication VEGADIS 61*
3 *Ground terminal for connection of the cable screen*
4 *Spring-loaded terminals for voltage supply*

Wiring plan

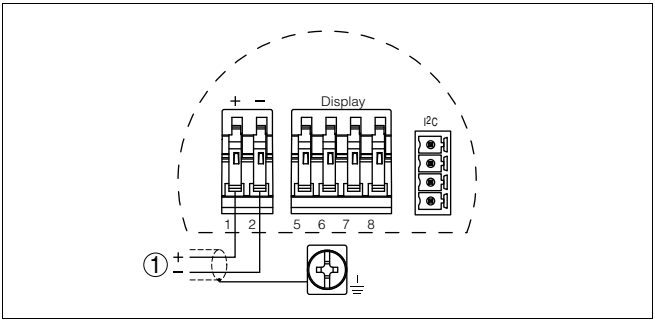


Fig. 9: Wiring plan, single chamber housing

1 *Voltage supply, signal output*

5.4 Wiring plan, double chamber housing

The following illustrations apply to the non-Ex as well as to the Ex-ia version.

Electronics compartment

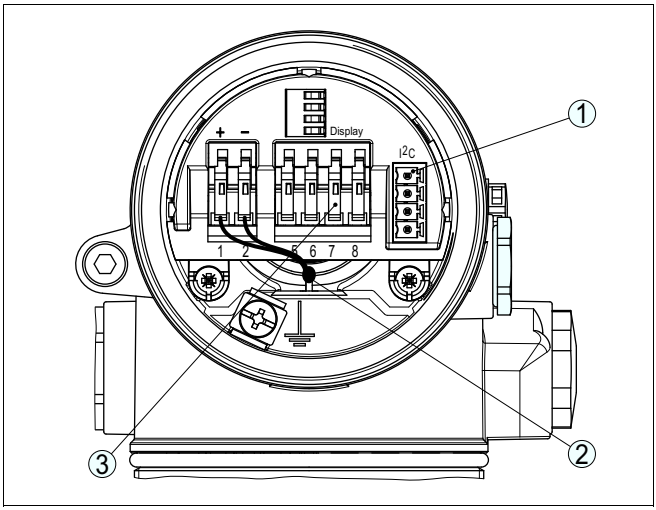


Fig. 10: Electronics compartment, double chamber housing

1 Plug connector for VEGACONNECT (I^2C interface)
2 Internal connection cable to the connection compartment
3 Terminals for VEGADIS 61

Connection compartment

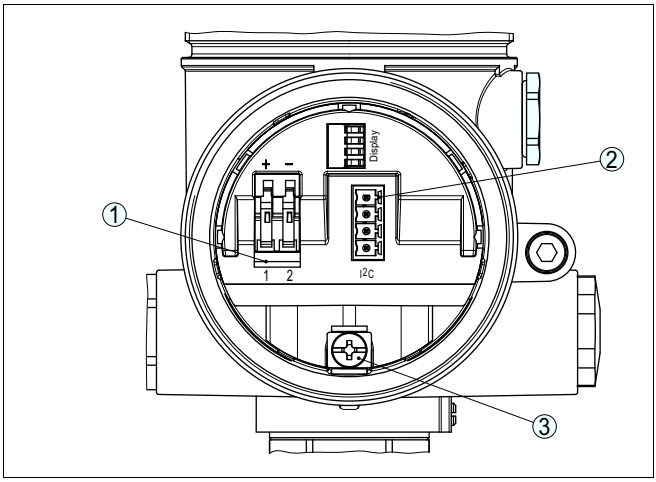


Fig. 11: Connection compartment double chamber housing

1 Spring-loaded terminals for voltage supply
2 Plug connector for VEGACONNECT (I^2C interface)
3 Ground terminal for connection of the cable screen

Wiring plan

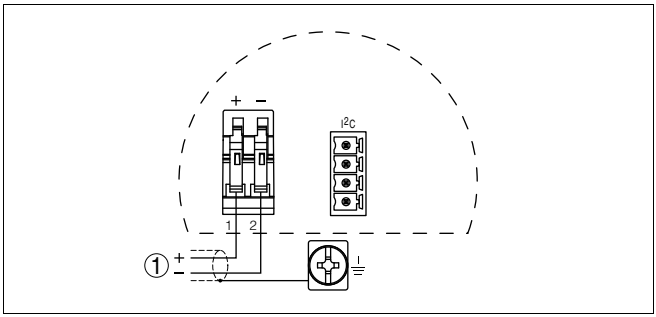


Fig. 12: Wiring plan, double chamber housing

1 Voltage supply, signal output

5.5 Wiring plan - version IP 66/IP 68, 1 bar

Wire assignment connection cable

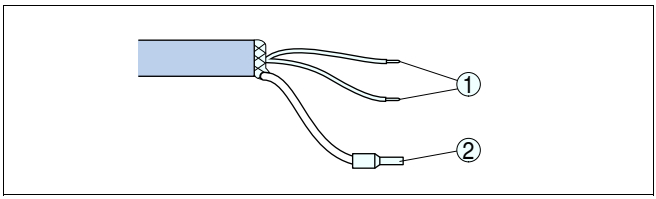


Fig. 13: Wire assignment connection cable

1 brown (+) and blue (-) to power supply or to the processing system
2 Shielding

6 Set up with the indicating and adjustment module PLICSCOM

6.1 Short description

Function/Configuration

The indicating and adjustment module is used for measured value display, adjustment and diagnosis. It can be mounted in the following housing versions and instruments:

- All sensors of the plics® instrument family, in the single as well as in the double chamber housing (optionally in the electronics or connection compartment)
- External indicating and adjustment unit VEGADIS 61

From a hardware version ...- 01 or higher of PLICSCOM as well as a hardware version ...- 01, 03 or higher of the corresponding sensor, an integrated backlight can be switched on via the adjustment menu. The hardware version is stated on the type label of the PLICSCOM or the sensor electronics.

Note:
You can find detailed information on the adjustment in the operating instructions manual "*Indicating and adjustment module*".

6.2 Insert indicating and adjustment module

Mount/Dismount indicating and adjustment module

The indicating and adjustment module can be inserted into the sensor and removed again at any time. It is not necessary to interrupt the power supply.

Proceed as follows:

1 Unscrew the housing cover
2 Place the indicating and adjustment module in the desired position on the electronics (you can choose any one of four different positions - each displaced by 90°)
3 Press the indicating and adjustment module onto the electronics and turn it to the right until it snaps in.
4 Screw housing cover with inspection window tightly back on

Removal is carried out in reverse order.

The indicating and adjustment module is powered by the sensor, an additional connection is not necessary.

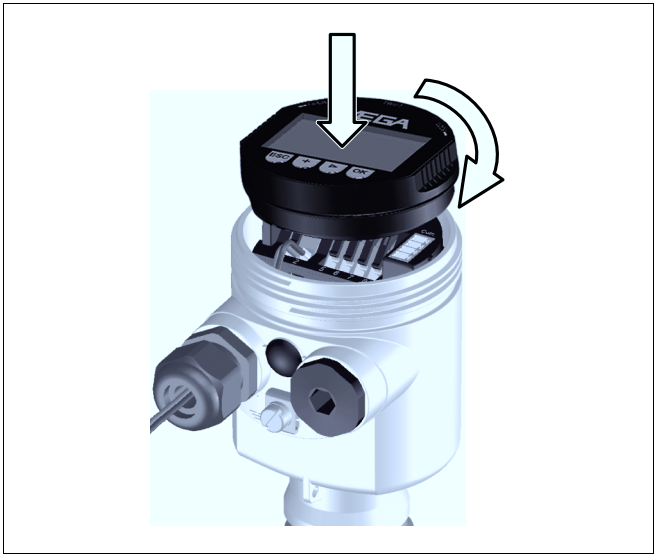


Fig. 14: Insert indicating and adjustment module

Note:
If you intend to retrofit the instrument with an indicating and adjustment module for continuous measured value indication, a higher cover with an inspection glass is required.

6.3 Adjustment system

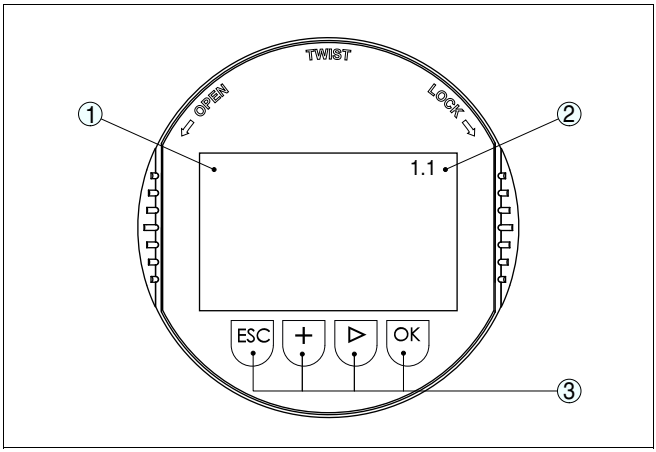


Fig. 15: Indicating and adjustment elements

1 LC display
2 Indication of the menu item number
3 Adjustment keys

Key functions

- ***[OK]*** key:
  - Move to the menu overview
  - Confirm selected menu
  - Edit parameter
  - Save value
- ***[->]*** key to select:
  - Menu change
  - Select list entry
  - Select editing position
- ***[+]*** key:
  - Change value of the parameter
- ***[ESC]*** key:
  - interrupt input
  - Return to higher-ranking menu

Adjustment system

The sensor is adjusted via the four keys of the indicating and adjustment module. The LC display indicates the individual menu items. The functions of the individual keys are shown in the above illustration. Approx. 10 minutes after the last pressing of a key, an automatic reset to measured value indication is triggered. Any values not confirmed with ***[OK]*** will not be saved.

6.4 Setup steps

Switch-on phase

After VEGAFLEX 67 is connected to voltage supply or after voltage recurrence, the instrument carries out a self-check for approx. 30 seconds. The following steps are carried out:

- Internal check of the electronics
- Indication of the instrument type, the firmware as well as the sensor TAGs (sensor designation)
- Status byte goes briefly to fault value

Then the current measured value will be displayed and the corresponding digital output signal will be outputted to the cable.[1)]

Address setting

Before starting the actual parameter adjustment of a Profibus PA sensor, the address setting must first be carried out. You will find a detailed description in the operating instructions manual of the indicating and adjustment module or in the online help of PACTware or DTM.

Parameter adjustment

As VEGAFLEX 67 is a distance measuring instrument, the distance from the sensor to the product surface is measured. To have the real product level displayed, an allocation of the measured distance to the percentage height must be made. To carry out this adjustment, the distance is entered with full and empty vessel. If these values are not known, an adjustment with the distance values, e.g. 10 % and 90 % is also possible. Starting point for these distance specifications is always the seal surface of the thread or flange. With these settings, the real level is calculated. Furthermore the operating range of the sensor is limited from maximum to the required range.

The real product level during this adjustment is not important, because the min./max. adjustment is always carried out without changing the product level. These settings can be made ahead of time without the instrument having to be installed.

In the main menu item "*Basic adjustment*", the individual submenu items should be selected one after the other and provided with the correct parameter values.

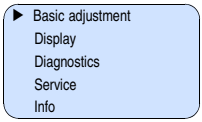
Start your parameter adjustment with the following menu items of the basic adjustment:

Carry out min. adjustment

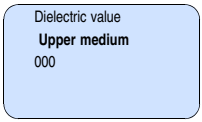
Proceed as follows:

1 Move from the measured value display to the main menu by pushing ***[OK]***.

[1)] The values correspond to the actual measured level as well as to the settings already carried out, e.g. default setting.

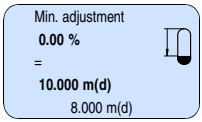


2 Select the menu item "*Basic adjustment*" with ***[->]*** and confirm with ***[OK]***. Now the menu item "**Dielectric value**" is displayed.



3 Enter the dielectric figure (DK value) of the upper medium and confirm with ***[OK]***.

Save the settings with ***[OK]*** and move to "Min. adjustment" with ***[->]***.



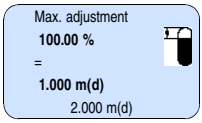
4 Prepare the % value for editing with ***[OK]*** and set the cursor to the requested position with ***[->]***. Set the requested percentage value with ***[+]*** and save with ***[OK]***. The cursor jumps now to the distance value.

5 Enter the suitable distance value in m for the empty vessel (e.g. distance from the sensor to the vessel bottom) corresponding to the percentage value.

6 Save the settings with ***[OK]*** and move to "Max. adjustment" with ***[->]***.

Carry out max. adjustment

Proceed as follows:



1 Prepare the % value for editing with ***[OK]*** and set the cursor to the requested position with ***[->]***. Set the requested percentage value with ***[+]*** and save with ***[OK]***. The cursor jumps now to the distance value.

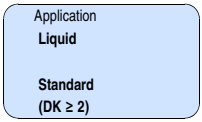
2 Enter the appropriate distance value in m (corresponding to the percentage value) for the full vessel. Keep in mind that the max. level must lie below the dead band.

3 Save the settings with ***[OK]***.

Application

Each product has different reflective properties. In addition, there are various interfering factors which have to be taken into account: agitated product surfaces and foam generation (with liquids); dust generation, material cones and echoes from the vessel wall (with solids). To adapt the sensor to these different conditions, you should first select in this menu item under "*Medium*" either "*Liquid*" or "*Solid*".

With coax versions, this menu item must be set to "*Liquid*".



Measured products have different reflective properties that depend on the dielectric figure (dielectric constant). For that reason there is an additional selection option.

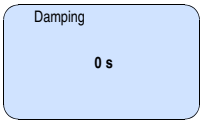
Under "*Sensitivity*" you can select "*Standard (DK ≥ 2)*" or "*Increased sensitivity (DK < 2)*".

Through this the sensor is optimally adapted to the product and measurement reliability, particularly in products with poor reflective properties, is considerably increased.

Enter the requested parameters via the appropriate keys, save your settings and jump to the next menu item with the ***[->]*** key.

Damping

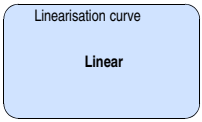
To suppress fluctuations in the measured value display, e. g. caused by an agitated product surface, a damping can be set. This time can be between 0 and 999 seconds. Keep in mind that the reaction time of the entire measurement will then be longer and the sensor will react to measured value changes with a delay. In general, a period of a few seconds is sufficient to smooth the measured value display.



Enter the requested parameters via the appropriate keys, save your settings and jump to the next menu item with the ***[->]*** key.

Linearisation curve

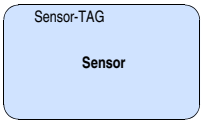
A linearisation is necessary for all vessels in which the vessel volume does not increase linearly with the level - e.g. in a horizontal cylindrical or spherical tank - and the indication or output of the volume is required. Corresponding linearisation curves are preprogrammed for these vessels. They represent the correlation between the level percentage and vessel volume. By activating the appropriate curve, the volume percentage of the vessel is displayed correctly. If the volume should not be displayed in percent but e.g. in l or kg, a scaling can be also set in the menu item "*Display*".



Enter the requested parameters via the appropriate keys, save your settings and jump to the next menu item with the ***[->]*** key.

Sensor-TAG

In this menu item you can enter an unambiguous designation for the sensor, e.g. the measurement loop name or the tank or product designation. In digital systems and in the documentation of larger plants, a singular designation should be entered for exact identification of individual measuring points.

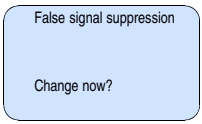


With this menu item, the Basic adjustment is finished and you can now jump to the main menu with the ***[ESC]*** key.

False signal suppression

High sockets or vessel installations, such as e.g. struts or agitators as well as buildup and weld joints on the vessel walls cause interfering reflections which can impair the measurement. A false echo storage detects and marks these false echoes, so that they are no longer taken into account for the level measurement. A false echo memory should be created with empty vessel so that all potential interfering reflections will be detected.

Probes in coax version require no gating out of false echoes since they are not influenced by false reflections.



Proceed as follows:

1. Move from the measured value display to the main menu by pushing ***[OK]***.
2. Select the menu item "*Service*" with ***[->]*** and confirm with ***[OK]***. Now the menu item "*False signal suppression*" is displayed.
3. Confirm "*False signal suppression - Change now*" with ***[OK]*** and select in the below menu "*Create new*". Enter the actual distance from the sensor to the product surface. All false signals in this area are detected by the sensor and saved after confirming with ***[OK]***.

Note:
Check the distance to the product surface, because if an incorrect (too large) value is entered, the existing level will be saved as false signal. The filling level would then no longer be detectable in this area.

Copy sensor data

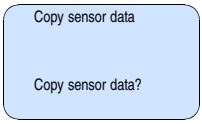
This function enables reading out parameter adjustment data as well as writing parameter adjustment data into the sensor via the indicating and adjustment module. A description of the function is available in the operating instructions manual "*Indicating and adjustment module*".

The following data are read out or written with this function:

- Measured value presentation
- Adjustment
- Medium
- Vessel form
- Damping
- Linearisation curve
- Sensor-TAG
- Displayed value
- Unit of measurement
- Language
- Sensitivity
- PA scaling unit
- PV-Out-Scale
- Channel
- Additional PA value
- Dielectric figure

The following safety-relevant data are **not** read out or written:

- HART mode
- PIN
- Sensor length/Sensor type
- False signal suppression



Reset

Basic adjustment

If the function "*Reset*" is carried out, the sensor resets the values of the following menu items to the reset values (see chart):[2)]

The following values will be reset:

[2)] Sensor-specific basic adjustment.

Function	Reset value
Max. adjustment	Distance, upper dead zone
Min. adjustment	Distance, supplied sensor length
Min. adjustment - Cable version	Distance, lower dead zone
Damping ti	0 s
Linearisation	Linear
Sensor-TAG	Sensor
Display	PA-Out 1
Channel (PV)	lin %
Additional PA value (PV)	lin %
Out-Scale-Unit	%
PV-Out-Scale	0.00 lin % = 0.0 % 100.0 lin % = 100 %

The values of the following menu items are *not* reset to the reset values (see chart) with "**Reset**":

Function	Reset value
Sensor address	No reset
Language	No reset

Factory setting
Like basic adjustment, but in addition, special parameters are reset to default values.[3)]

Peak value
The min. and max. distance values are reset to the actual value.

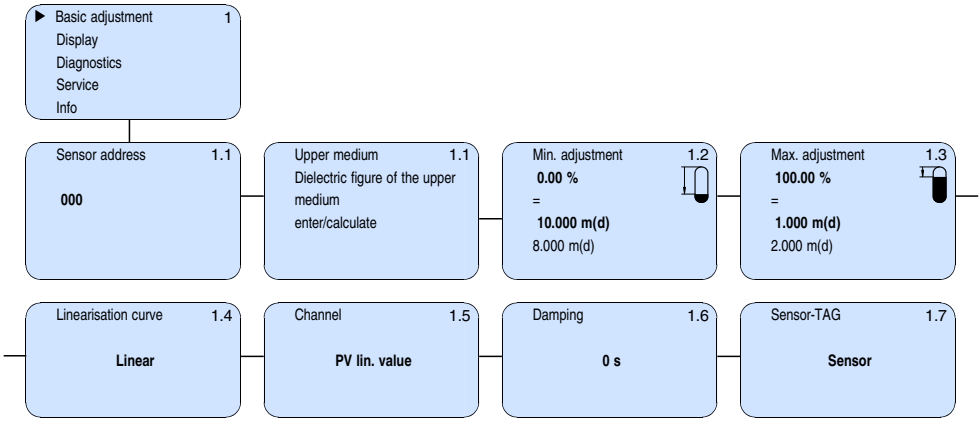
Optional settings

Additional adjustment and diagnosis options such as e.g. scaling, simulation or trend curve presentation are shown in the following menu schematic. You will find a detailed description of these menu items in the operating instructions manual "*Indicating and adjustment module*".

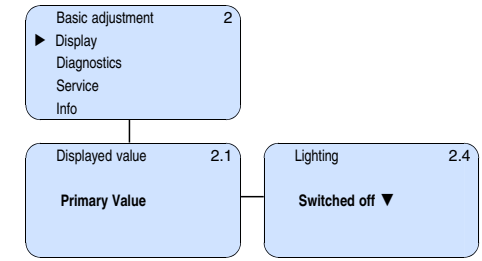
[3)] Special parameters are parameters which are set customer-specifically on the service level with the adjustment software PACTware.

6.5 Menu schematic

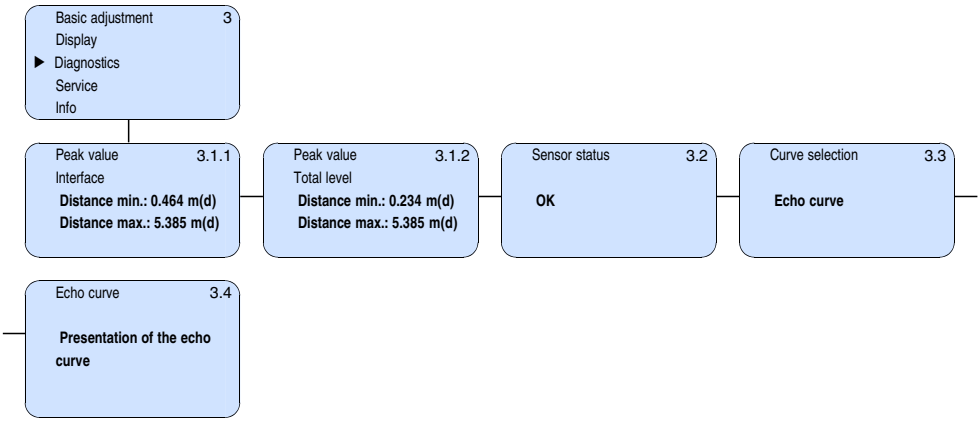
Basic adjustment



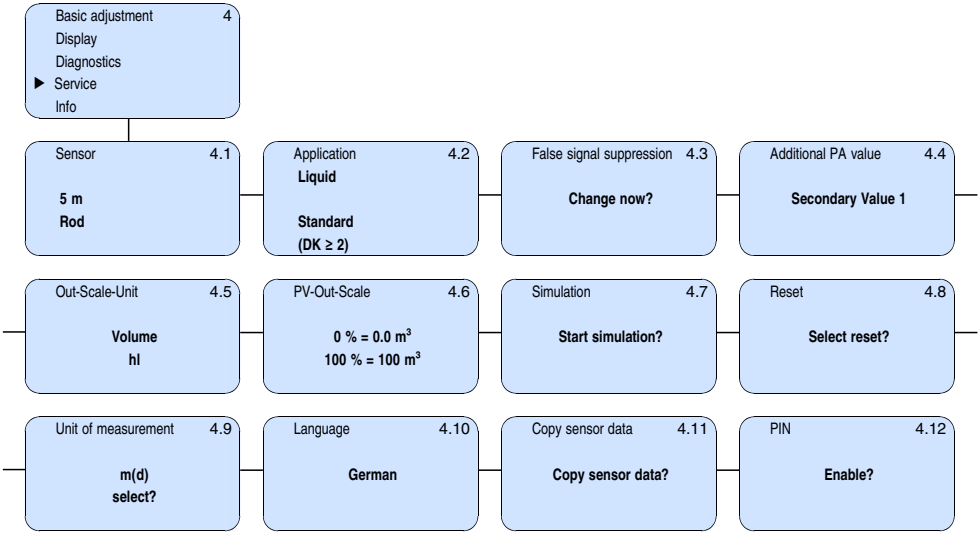
Display



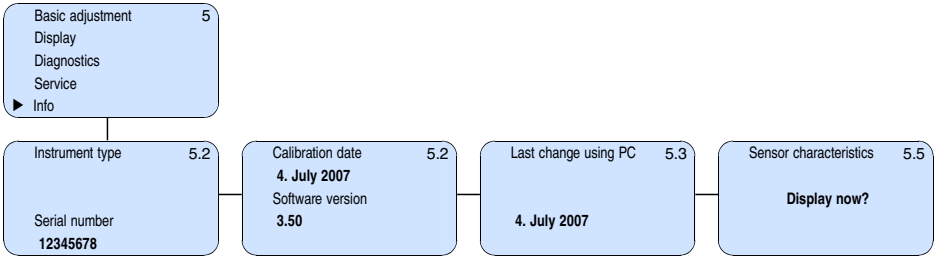
Diagnostics



Service



Info


Basic adjustment 5
Display
Diagnostics
Service
Info
Instrument type 5.2
Serial number
12345678
Calibration date 5.2
4. July 2007
Software version
3.50
Last change using PC 5.3
4. July 2007
Sensor characteristics 5.5
Display now?

6.6 Saving the parameter adjustment data

We recommended noting the adjusted data, e.g. in this operating instructions manual, and archiving them afterwards. They are thus available for multiple use or service purposes.

If VEGAFLEX 67 is equipped with an indicating and adjustment module, the most important data can be read out of the sensor into the indicating and adjustment module. The procedure is described in the operating instructions manual "*Indicating and adjustment module*" in the menu item "*Copy sensor data*". The data remain there permanently even if the sensor power supply fails.

If it is necessary to exchange the sensor, the indicating and adjustment module is inserted into the replacement instrument and the data are written into the sensor under the menu item "*Copy sensor data*".

7 Set up with PACTware and other adjustment programs

7.1 Connect the PC

VEGACONNECT directly on the sensor

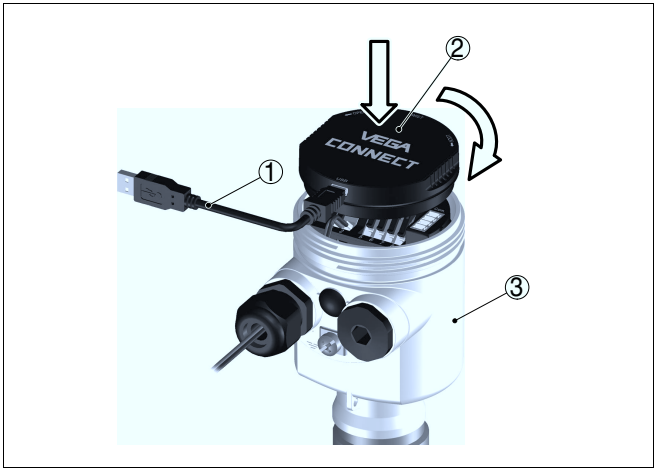


Fig. 16: Connection of the PC via VEGACONNECT directly to the sensor

1 USB cable to the PC
2 VEGACONNECT
3 Sensor

VEGACONNECT externally

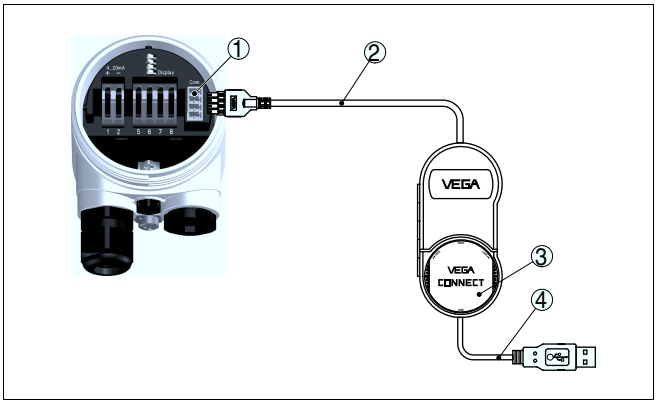


Fig. 17: Connection via VEGACONNECT externally

1 I^2C bus (com.) interface on the sensor
2 I^2C connection cable of VEGACONNECT
3 VEGACONNECT
4 USB cable to the PC

Necessary components:

- VEGAFLEX 67
- PC with PACTware and suitable VEGA DTM
- VEGACONNECT
- Power supply unit or processing system

7.2 Parameter adjustment with PACTware

Further setup steps are described in the operating instructions manual "*DTM Collection/PACTware*" attached to each CD and which can also be downloaded from our homepage. A detailed description is available in the online help of PACTware and the VEGA DTMs.

Note:
Keep in mind that for setup of VEGAFLEX 67, DTM-Collection in the actual version must be used.

All currently available VEGA DTMs are included as a DTM Collection on a CD. They can be purchased for a token fee from the responsible VEGA agency. In addition, the actual PACTware version is also available on this CD.

In addition, this DTM Collection incl. the basic version of PACTware can be downloaded free of charge from the Internet. Move via www.vega.com and "*Downloads*" to "*Software*".

7.3 Parameter adjustment with PDM

For VEGA sensors, instrument descriptions for the adjustment program PDM are available as EDD. The instrument descriptions are already implemented in the current version of PDM. For older versions of PDM, a free-of-charge download is available via Internet.

Go via www.vega.com and "*Downloads*" to the item "*Software*".

7.4 Saving the parameter adjustment data

It is recommended to document or save the parameter adjustment data. That way they are available for multiple use or service purposes.

The VEGA DTM Collection and PACTware in the licensed, professional version provide suitable tools for systematic project documentation and storage.

8 Maintenance and fault rectification

8.1 Maintenance

If the instrument is used properly, no special maintenance is required in normal operation.

8.2 Remove interferences

Failure reasons

VEGAFLEX 67 offers maximum reliability. Nevertheless, faults can occur during operation. These may be caused by the following, e.g.:

- Sensor
- Process
- Voltage supply
- Signal processing

Fault rectification

The first measures to be taken are to check the output signals as well as to evaluate the error messages via the indicating and adjustment module. The procedure is described below. Further comprehensive diagnostics can be carried out on a PC with the software PACTware and the suitable DTM. In many cases, the causes can be determined and the faults rectified this way.

24 hour service hotline

Should these measures not be successful, please call in urgent cases the VEGA service hotline under the phone no. **+49 1805 858550**.

The hotline is available to you 7 days a week round-the-clock. Since we offer this service world-wide, the support is only available in the English language. The service is free of charge, only the standard telephone costs will be charged.

Checking Profibus PA

The following table describes possible errors and helps to remove them:

Error	Cause	Rectification
When an additional instrument is connected, the segment fails.	Max. supply current of the segment coupler exceeded	Measure the current consumption, reduce size of segment
Wrong presentation of the measured value in Simatic S5	Simatic S5 cannot interpret the number format IEEE of the measured value	Insert converting component from Siemens
In Simatic S7 the measured value is always presented as 0	Only four bytes are consistently loaded in the PLC	Use function component SFC 14 to load 5 bytes consistently

Error	Cause	Rectification
Measured value on the indicating and adjustment module does not correspond to the value in the PLC	The menu item "*Display - Display value*" is not set to "*PA-Out*"	Check values and correct, if necessary
No connection between PLC and PA network	Incorrect adjustment of the bus parameter and the segment coupler-dependent baud rate	Check data and correct, if necessary
Instrument does not appear during connection setup	Profibus DP cable pole-reversed	Check cable and correct, if necessary
	Incorrect termination	Check termination at the beginning and end points of the bus and terminate, if necessary, according to the specification
	Instrument not connected to the segment, double assignment of an address	Check and correct, if necessary

In Ex applications, the regulations for the wiring of intrinsically safe circuits must be observed.

Error messages via the indicating and adjustment module

The indicating and adjustment modules indicates faults via error codes and text messages. The following table describes the error codes with status according to NE 107 and gives information on the causes of failure and their removal:

Status according to NE 107	Error code	Text message	Cause/Rectification
Failure	E013	no measured value available	Sensor in boot phase
		no measured value available	Sensor does not find an echo, e.g. due to faulty installation or wrong parameter adjustment
		no measured value available	Wrong sensor length entered
	E017	Adjustment span too small	Adjustment not within the specification. Carry out the adjustment again, increasing the distance between min. and max. adjustment
	E036	No operable software	Failed or interrupted software update/Repeat software update

Status according to NE 107	Error code	Text message	Cause/Rectification
	E042	Hardware error, electronics defective	Exchange the instrument or send it in for repair
	E043	Hardware error, electronics defective	Exchange the instrument or send it in for repair
	E113	Communication conflict	Exchange the instrument or send it in for repair

8.3 Exchanging the electronics module

If the electronics module is defective, it can be replaced by the user.

In Ex applications only one instrument and one electronics module with respective Ex approval may be used.

If there is no electronics module available on site, one can be ordered from the VEGA agency serving you.

Sensor serial number

The new electronics module must be loaded with the settings of the sensor. These are the options:

- At the factory by VEGA
- Or on site by the user

In both cases, the sensor serial number is necessary. The serial numbers are stated on the type label of the instrument, inside the housing or on the delivery note.

Information:
When loading on site, first of all the order data must be downloaded from the Internet (see operating instructions manual "*Electronics module*").

Assignment

The electronics modules are adapted to the respective sensor and distinguish also in the signal output or power supply.

Profibus PA

Electronics module FX-E.67P suitable for VEGAFLEX 67 - Profibus PA:

- FX-E.67P**X** (X = without approvals)
- FX-E.67P**C** (C = approvals XM, CX, CM according to product list)

8.4 Software update

The software version of VEGAFLEX 67 can be determined as follows:

- on the type label of the electronics
- via the indicating and adjustment module
- via PACTware

You can view all software histories on our website www.vega.com. Make use of this advantage and get registered for update information via e-mail.

The following components are required to update the sensor software:

- Sensor
- Voltage supply
- VEGACONNECT
- PC with PACTware
- Current sensor software as file

Load sensor software to PC

At "www.vega.com/downloads" go to "*Software*". Select under "*plics sensors and instruments*", "*Firmware updates*" the respective instrument series and software version. Load the zip file via the right mouse key with "*Save target as*" e.g. on the desktop of your PC. Move with the right mouse key to the folder and select "*Extract all*". Save the extracted files, for example on the desktop.

Prepare update

Connect the signal conditioning instrument to power supply and provide the connection from the PC to the instrument via the interface adapter. Start PACTware and go via the menu "*Project*" to the *VEGA project assistant*. Select "*USB*" and "*Set instruments online*". Activate the project assistant with "*Start*". The assistant establishes the connection automatically and opens the parameter adjustment window "*Sensor # online parameter adjustment*". Connect this parameter adjustment window before you carry out further steps.

Load software into sensor

Select with the right mouse key the sensor in the project and go to "*Additional function*". Then click to "*Software update*". The window "*Sensor # software update*" opens. PACTware checks now the sensor data and displays the actual hardware and software version of the sensor. This takes approximately 60 s.

Push the button "*Update software*" and select the previously extracted hex file. Then the software update can be started. The additional files are installed automatically. Depending on the sensor, this procedure lasts up to 1 h. Then the message appears ""*Software update successfully executed*".

8.5 Instrument repair

If a repair is necessary, please proceed as follows:

You can download a return form (23 KB) from our homepage at www.vega.com under: "*Downloads - Forms and certificates - Repair form*".

By doing this you help us carry out the repair quickly and without having to call back for needed information.

- Print and fill out one form per instrument
- Clean the instrument and pack it damage-proof
- Attach the completed form and, if need be, also a safety data sheet outside on the packaging

- Please ask the agency serving you for the address of your return shipment. You can find the respective agency on our website www.vega.com under: "*Company - VEGA worldwide*"

9 Dismounting

9.1 Dismounting steps

Warning:
Before dismounting, be aware of dangerous process conditions such as e.g. pressure in the vessel, high temperatures, corrosive or toxic products etc.

Take note of chapters "*Mounting*" and "*Connecting to power supply*" and carry out the listed steps in reverse order.

9.2 Disposal

The instrument consists of materials which can be recycled by specialised recycling companies. We use recyclable materials and have designed the electronics to be easily separable.

WEEE directive 2002/96/EG

This instrument is not subject to the WEEE directive 2002/96/EG and the respective national laws. Pass the instrument directly on to a specialised recycling company and do not use the municipal collecting points. These may be used only for privately used products according to the WEEE directive.

Correct disposal avoids negative effects on humans and the environment and ensures recycling of useful raw materials.

Materials: see chapter "*Technical data*"

If you have no way to dispose of the old instrument properly, please contact us concerning return and disposal.

10 Supplement

10.1 Technical data

General data

Material 316L corresponds to 1.4404 or 1.4435

Materials, wetted parts - version -200 … +400°C (-328 … +752°F)

– Process fitting - coax version	316L and Aluminium oxide-ceramic 99.7 % (Al_2O_3), Hastelloy C22 (2.4602) and Aluminium oxide-ceramic 99.7 % (Al_2O_3)
– Process fitting - rod version	316L and Aluminium oxide-ceramic 99.7 % (Al_2O_3), Hastelloy C22 (2.4602) and Aluminium oxide-ceramic 99.7 % (Al_2O_3)
– Process fitting - cable version	316L and Aluminium oxide-ceramic 99.7 % (Al_2O_3)
– Tube: ø 43 mm (1.693 in)	316L or Hastelloy C22 (2.4602)
– Rod: ø 16 mm (0.63 in)	316L or Hastelloy C22 (2.4602)
– Cable: ø 6 mm (0.236 in)	316 (1.4401)
– Gravity weight (optionally available)	316L
– Process seal on the instrument side (cable/rod leadthrough)	Graphite
– Process seal	On site

Materials, non-wetted parts

– Plastic housing	plastic PBT (Polyester)
– Aluminium die-casting housing	Aluminium die-casting AlSi10Mg, powder-coated - basis: Polyester
– Stainless steel housing - precision casting	316L
– Stainless steel housing, electropolished	316L
– Seal between housing and housing cover	NBR (stainless steel housing, precision casting), silicone (aluminium/plastic housing; stainless steel housng, electropolished)
– Inspection window in housing cover (optional)	Polycarbonate
– Ground terminal	316L

Process fittings

– Pipe thread, cylindrical (DIN 3852-A)	G1½ A
– American pipe thread, conical (ASME B1.20.1)	1½ NPT
– Flanges	DIN from DN 50, ANSI from 2"

Weights - version -200 … +400 °C (-328 … +752 °F)

– Instrument weight (depending on process fitting)	approx. 0.8 … 8 kg (0.176 … 17.64 lbs)
– Tube: ø 43 mm (1.693 in)	approx. 3600 g/m (38.7 oz/ft)

– Rod: ø 16 mm (0.63 in)	approx. 1600 g/m (17 oz/ft)
– Cable: ø 6 mm (0.236 in)	approx. 170 g/m (1.8 oz/ft)
– Gravity weight	approx. 730 g (25.8 oz)
Probe length L (from seal surface)	
– Tube: ø 43 mm (1.693 in)	up to 6 m (19.69 ft)
– Trimming accuracy - tube	< 1 mm (0.039 in)
– Rod: ø 16 mm (0.63 in)	up to 6 m (19.69 ft)
– Trimming accuracy - rod	< 1 mm (0.039 in)
– Cable: ø 6 mm (0.236 in)	up to 60 m (196.9 ft)
– Trimming accuracy - cable	±0.05 %
Max. tensile load with cable: ø 6 mm (0.236 in)	10 KN (2248 lbf)
Lateral load	
– Tube: ø 43 mm (1.693 in)	100 Nm (74 lbf ft)
– Rod: ø 16 mm (0.63 in)	30 Nm (22 lbf ft)

Input variable

Measured variable	Level of liquids
Min. dielectric figure (lower medium)	by 10 higher than the ε_r of the upper medium
Min. layer thickness (upper medium)	> 100 mm (3.9 in) The measured value deviates from the actual level until the min. layer thickness is reached.
Max. layer thickness (upper medium)	
– Dielectric figure (upper medium) 10	6 m (19.69 ft)
– Dielectric figure (upper medium) 5	10 m (32.81 in)
– Dielectric figure (upper medium) 2	20 m (65.61 in)
Min. dielectric figure (upper medium) - coax version	ε_r > 1.4

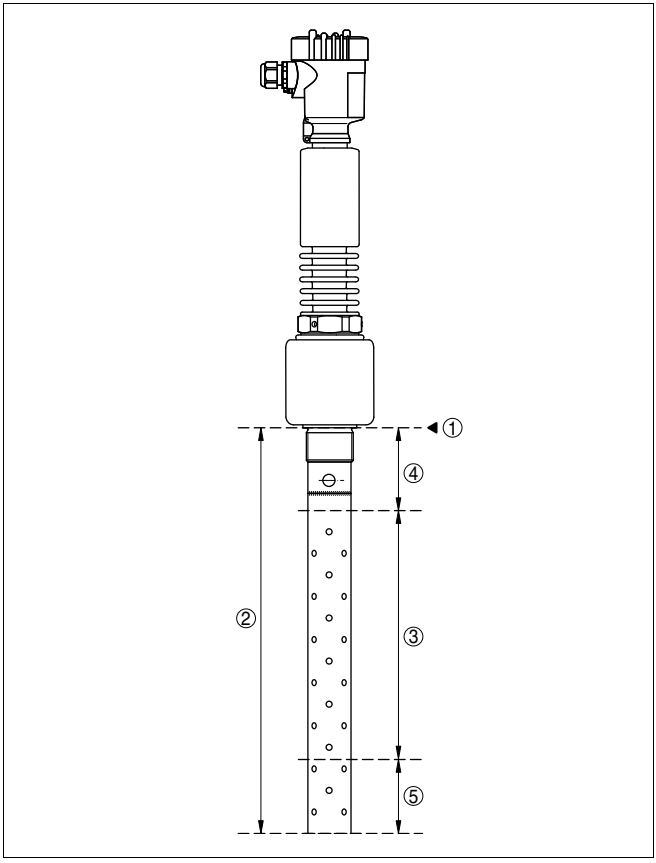


Fig. 18: Measuring ranges of VEGAFLEX 67 - coax version

1 Reference plane
2 Probe length
3 Measuring range (default setting refers to the measuring range in water)
4 Upper dead band (see diagrams under Accuracy - grey section)
5 Lower dead band (see diagrams under Accuracy - grey section)

Min. dielectric figure (upper medium) with rod, cable version $\varepsilon_r > 1.6$

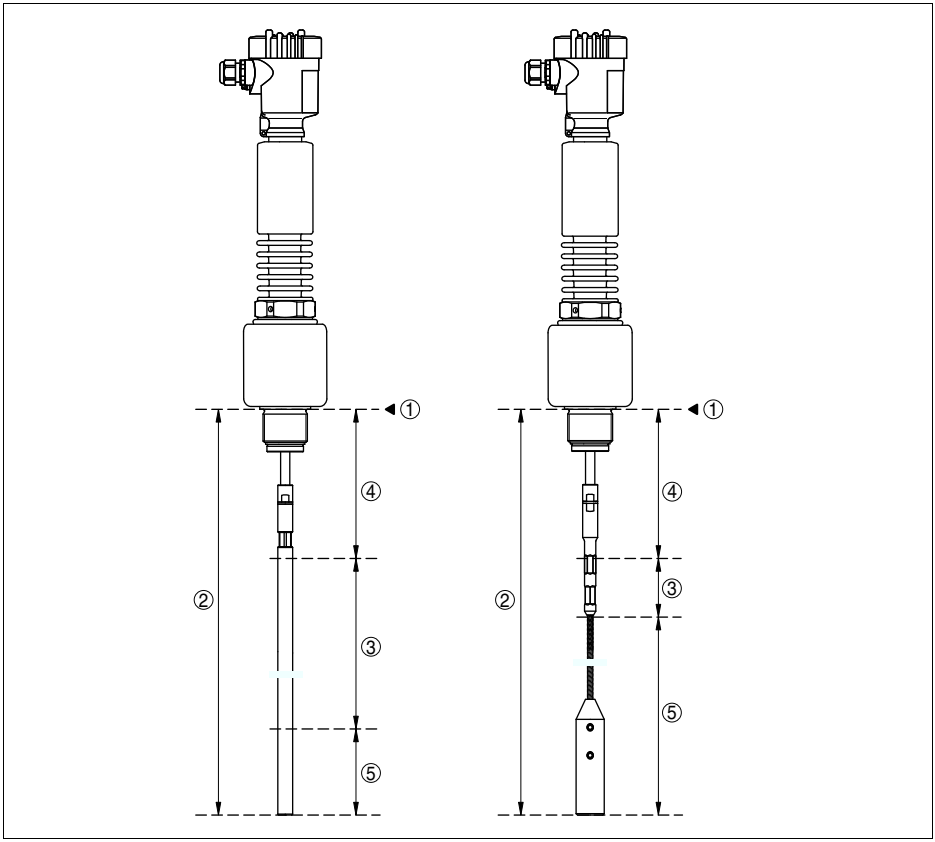


Fig. 19: Measuring ranges of the VEGAFLEX 67 - rod and cable version

1 Reference plane
2 Probe length
3 Measuring range
4 Upper dead band (see diagrams under Accuracy - grey section)
5 Lower dead band (see diagrams under Accuracy - grey section)

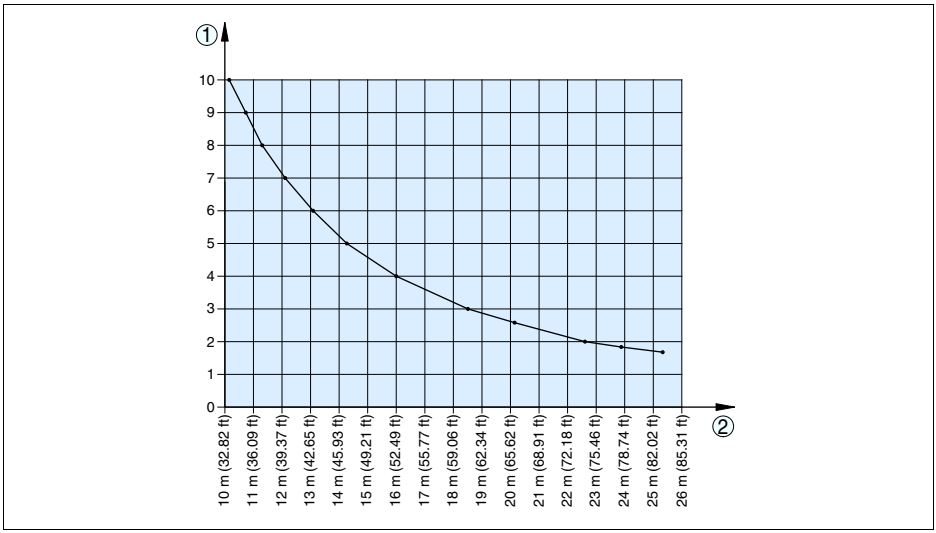


Fig. 20: Relation dielectric figure (ε_r) of the upper medium to the max. probe length

1 Dielectric figure (ε_r) of the upper medium
2 Max. probe length

Output variable	
Output signal	digital output signal, format according to IEEE-754
Cycle time	min. 1 s (dependent on the parameter setting)
Sensor address	126 (default setting)
Current value	10 mA, ±0.5 mA
Failure signal current output (adjustable)	mA-value unchanged 20.5 mA, 22 mA, < 3.6 mA
Max. output current	22 mA
Load	see load diagram under Power supply
Damping (63 % of the input variable)	0 … 999 s, adjustable
Fulfilled NAMUR recommendations	NE 43
PA output values	
– Primary Value	Height of the interface - after linearization (h1)
– Secondary Value	Height of the interface (h1)
– Secondary Value 2	Distance to the interface (d1)
– Distance Level	Distance to the level (d2)

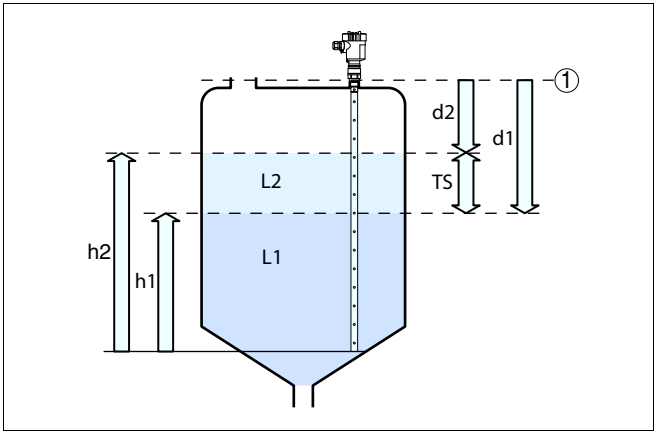


Fig. 21: Interface measurement (interface is between L1 and L2)

1 Reference plane
d1 Distance to the interface (Secondary Value 2)
d2 Distance to the level (Distance Level)
TS Thickness of the upper medium (d1 - d2)
h1 Height - interface (Secondary Value)
h2 Height - Level
L1 Lower medium
L2 Upper medium

Resolution, digital	> 1 mm (0.039 in)

Accuracy (according to DIN EN 60770-1)

Process reference conditions according to DIN EN 61298-1	
– Temperature	+18 … +30 °C (+64 … +86 °F)
– Relative humidity	45 … 75 %
– Air pressure	+860 … +1060 mbar/+86 … +106 kPa (+12.5 … +15.4 psig)
– Emulsion phase	< 2 mm (< 0.079 in)
Installation reference conditions	
– Min. distance to installations	> 500 mm (19.69 in)
– Vessel	metallic, ø 1 m (3.281 ft), centric installation, process fitting flush with the vessel ceiling
– Medium	Water/Oil (dielectric figure ~2.0)
– Installation	Probe end does not touch the vessel bottom
Sensor parameter adjustment	Gating out of false signals carried out
Deviation	see diagrams The accuracy values of the diagrams refer to the

32313-EN-120329

interface.
Depending on the installation conditions, there can be deviations which can be rectified with an adaptation of the adjustment or a change of the measured value offset in the DTM service mode.

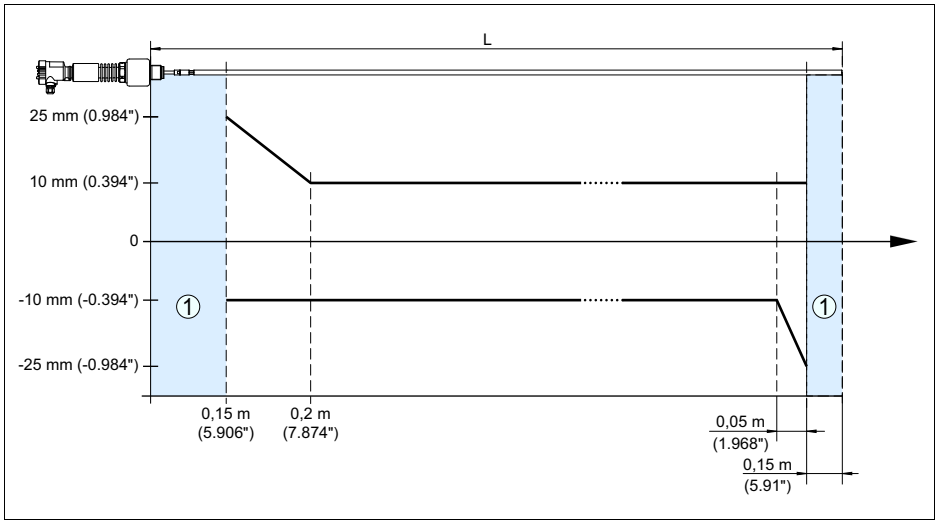


Fig. 22: Deviation VEGAFLEX 67 in rod version

1 Dead zone - no measurement possible in this area
L Probe length

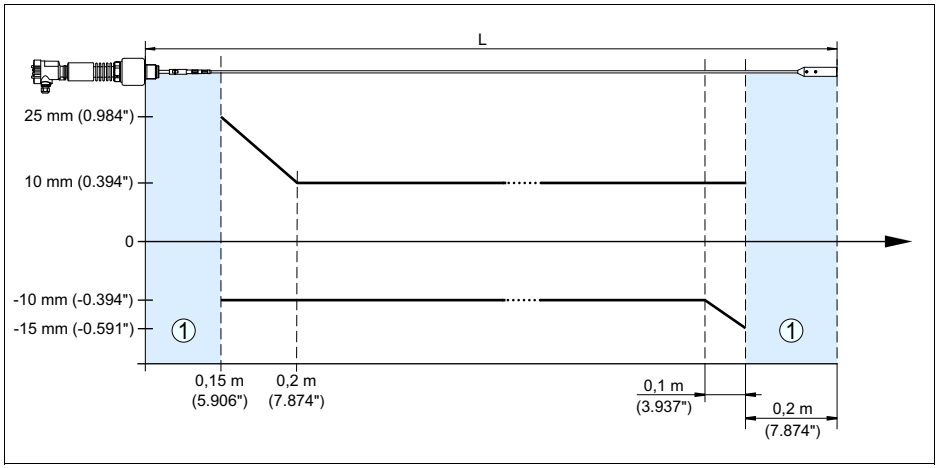


Fig. 23: Deviation VEGAFLEX 67 in cable version

1 Dead zone - no measurement possible in this area
L Probe length

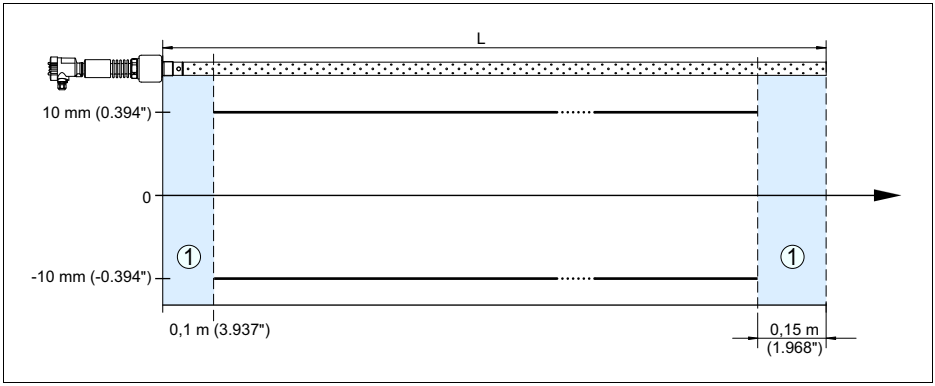


Fig. 24: Deviation VEGAFLEX 67 in coax version

1 Dead zone - no measurement possible in this area
L Probe length

Influence of the ambient temperature to the sensor electronics	
Temperature drift	0.03 %/10 K relating to the max. measuring range or max. 0.3 %
Temperature drift - Digital output	3 mm/10 K relating to the max. measuring range or max. 10 mm

Ambient conditions	
Ambient, storage and transport temperature	-40 … +80 °C (-40 … +176 °F)

Process conditions	
Process pressure	-1 … +400 bar/-100 … +40000 kPa (-14.5 … +5800 psig), depending on the process fitting

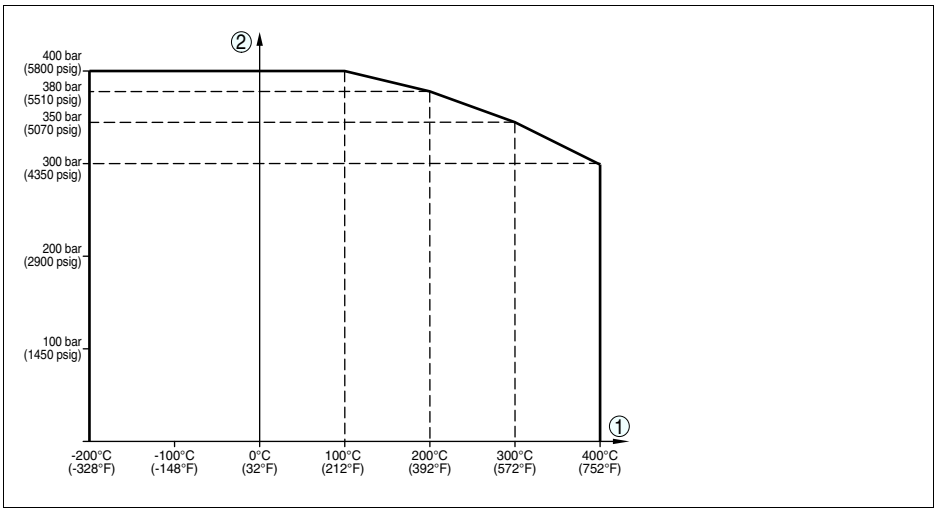


Fig. 25: High temperature version: Process pressure - process temperature

1 Process temperature
2 Process pressure

Process temperature (thread or flange temperature)	-200 … +400 °C (-328 … +752 °F)
	The measurement error from the process conditions is in the specified pressure and temperature range of below 1 %.

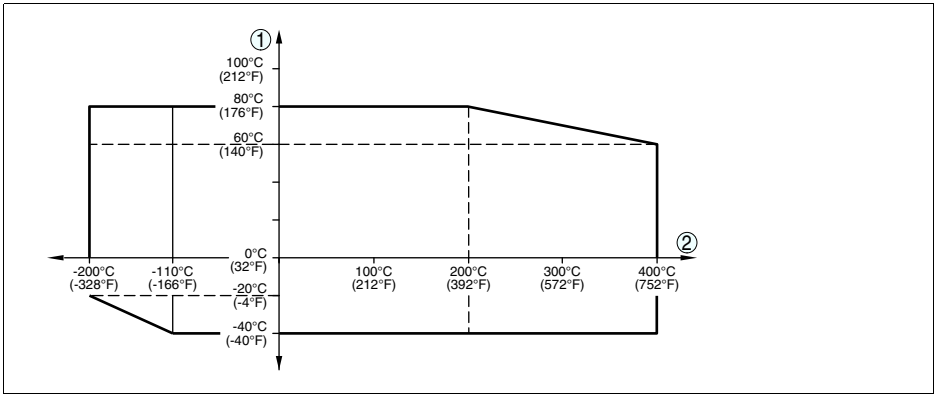


Fig. 26: Ambient temperature - process temperature (version -200 … +400 °C/-328 … +752 °F)

1 Ambient temperature
2 Process temperature (graphite seal)

Electromechanical data - version IP 66/IP 67 and IP 66/IP 68; 0.2 bar

Cable entry/plug[4]	
– Single chamber housing	• 1 x cable gland M20 x 1.5 (cable: ø 5 … 9 mm), 1 x blind stopper M20 x 1.5 or: • 1 x closing cap M20 x 1.5; 1 x blind stopper M20 x 1.5 or: • 1 x closing cap ½ NPT, 1 x blind plug ½ NPT or: • 1 x plug (depending on the version), 1 x blind stopper M20 x 1.5
– Double chamber housing	• 1 x cable entry M20 x 1.5 (cable: ø 5 … 9 mm), 1 x blind stopper M20 x 1.5; 1 x blind stopper M16 x 1.5 or optionally available with 1 x plug M12 x 1 for external indicating and adjustment unit or: • 1 x closing cap ½ NPT, 1 x blind stopper ½ NPT, 1 x blind stopper M16 x 1.5 or optionally 1 x plug M12 x 1 for external indicating and adjustment unit or: • 1 x plug (depending on the version), 1 x blind stopper M20 x 1.5; 1 x blind stopper M16 x 1.5 or optionally available with 1 x plug M12 x 1 for external indicating and adjustment unit
Spring-loaded terminals for wire cross-section	< 2.5 mm² (AWG 14)

Electromechanical data - version IP 66/IP 68 (1 bar)

Cable entry	
– Single chamber housing	1 x IP 68 cable gland M20 x 1.5; 1 x blind stopper M20 x 1.5
– Double chamber housing	1 x IP 68 cable gland M20 x 1.5; 1 x blind stopper M20 x 1.5; 1 x blind stopper M16 x 1.5
Connection cable	
– Wire cross-section	0.5 mm² (AWG 20)
– Wire resistance	< 0.036 Ω/m
– Tensile strength	< 1200 N (270 lbf)
– Standard length	5 m (16.4 ft)
– Max. length	1000 m (3280 ft)

[4] Depending on the version M12 x 1, according to DIN 43650, Harting, 7/8" FF.

– Min. bending radius	25 mm (0.984 in) with 25 °C (77 °F)
– Diameter approx.	8 mm (0.315 in)
– Colour - standard PE	Black
– Colour - standard PUR	Blue
– Colour - Ex-version	Blue

Indicating and adjustment module

Voltage supply and data transmission	through the sensor
Indication	LC display in dot matrix
Adjustment elements	4 keys
Protection rating	
– unassembled	IP 20
– mounted into the sensor without cover	IP 40
Materials	
– Housing	ABS
– Inspection window	Polyester foil

Voltage supply

Operating voltage	
– Non-Ex instrument	9 … 32 V DC
– EEx-ia instrument	9 … 24 V DC
– EEx-d instrument	16 … 32 V DC
Operating voltage with illuminated indicating and adjustment module	
– Non-Ex instrument	12 … 32 V DC
– EEx-ia instrument	12 … 24 V DC
– EEx-d instrument	20 … 32 V DC
Power supply by/max. number of sensors	
– DP/PA segment coupler	max. 32 (max. 10 with Ex)
– VEGALOG 571 EP card	max. 15 (max. 10 with Ex)

Electrical protective measures

Protection, depending on housing version	
– Plastic housing	IP 66/IP 67
– Aluminium housing, stainless steel housing - investment casting, stainless steel housing - electro-polished	IP 66/IP 68 (0.2 bar)[5]
– Aluminium and stainless housing, investment casting (optionally available)	IP 66/IP 68 (1 bar)
Overvoltage category	III

[5] A suitable cable is the prerequisite for maintaining the protection rating.

Protection class	II

Approvals

Instruments with approvals can have different technical data depending on the version.

That's why the associated approval documents have to be noted with these instruments. They are part of the delivery or can be downloaded under www.vega.com via "*VEGA Tools*" and "*serial number search*" as well as via "*Downloads*" and "*Approvals*".

10.2 Profibus PA

Instrument master file

The instrument master file (GSD) contains the characteristic data of the Profibus PA instrument. These data are, e.g. the permissible transmission rates as well as information on diagnostics values and the format of the measured value outputted by the PA instrument.

A bitmap file is also provided for the Profibus network planning tool. This file is installed automatically when the GSD file is integrated. The bitmap file is used for symbolic indication of the PA instrument in the configuration tool.

Ident number

Each Profibus instrument gets an unambiguous ident number (ID number) from the Profibus user organisation (PNO). This ID number is also included in the name of the GSD file. For VEGAFLEX 67 the ID number is **0 x 0771(hex)** and the GSD file **FX__0771.GSD**. Optionally to this manufacturer-specific GSD file, PNO provides also a general so-called profile-specific GSD file. For VEGAFLEX 67 you have to use the general GSD file **PA139700.GSD**. If the general GSD file is used, the sensor must be set to the profile-specific ident number via the DTM software. By default, the sensor operates with the manufacturer-specific ID number.

Cyclical data traffic

The master class 1 (e.g. PLC) cyclically reads out measured values from the sensor during operation. The below block diagram below shows which data can be accessed by the PLC.

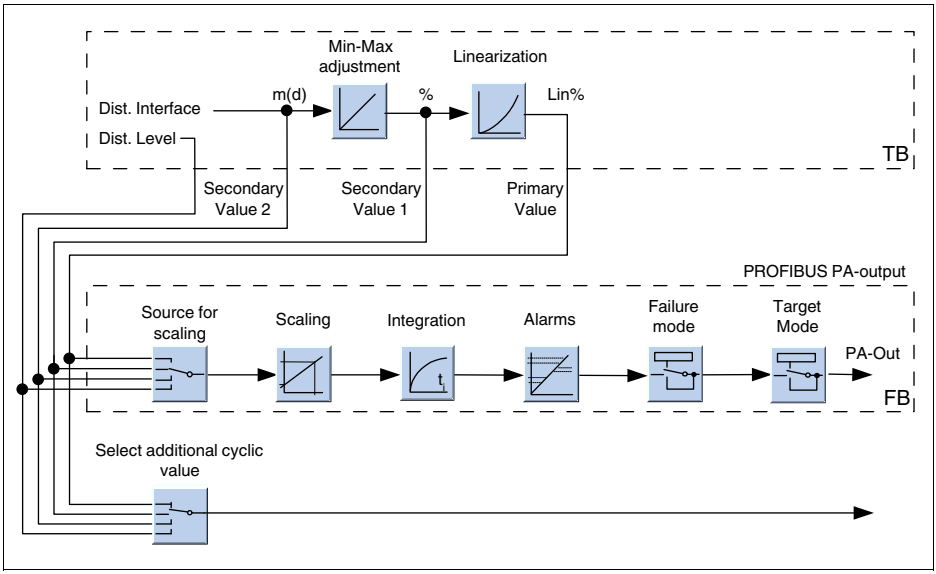


Fig. 27: VEGAFLEX 67: Block diagram with AI (PA-OUT) value and additional cyclical value

TB Transducer Block
FB Function Block

Module of the PA sensors
For the cyclic data traffic, VEGAFLEX 67 provides the following modules:

- AI (PA-OUT)

— PA-OUT value of the FB1 after scaling

- Additional Cyclic Value

— Additional cyclical value (depending on the source)

- Free Place

— This module must be used if a value should not be used in the data telegram of the cyclical data traffic (e.g. replacement of the Additional Cyclic Value)

A maximum of three modules can be active. By means of the configuration software of the Profibus master you can determine the configuration of the cyclical data telegram with these modules. The procedure depends on the respective configuration software.

Note:
The modules are available in two versions:

- Short for Profibus master supporting only one "Identifier Format" byte, e.g. Allen Bradley
- Long for Profibus master only supporting the "Identifier Format" byte, e.g. Siemens S7-300/400

Examples of telegram configuration
In the following you will see how the modules can be combined and how the appendant data telegram is structured.

Example 1 (standard setting) with distance value and additional cyclical value:

- AI (PA-OUT)
- Additional Cyclic Value

Byte-No.	1	2	3	4	5	6	7	8	9	10
Format	IEEE-754-Floating point value				Status	IEEE-754-Floating point value				Status
Value	PA-OUT (FB1)				Status (FB1)	Additional Cyclic Value				Status

Example 2 with distance value without additional cyclical value:

- AI (PA-OUT)

- Free Place

Byte-No.	1	2	3	4	5
Format	IEEE-754- Floating point value				Status
Value	PA-OUT (FB1)				Status (FB1)

Data format of the output signal

Byte4	Byte3	Byte2	Byte1	Byte0
Status	Value (IEEE-754)			

Fig. 30: Data format of the output signal

The status byte corresponds to profile 3.0 "Profibus PA Profile for Process Control Devices" coded. The status "Measured value OK" is coded as 80 (hex) (Bit7 = 1, Bit6 … 0 = 0).

The measured value is transferred as a 32 bit floating point number in the IEEE-754 format.

Byte n								Byte n+1								Byte n+2								Byte n+3							
Bit 7	Bit 6	Bit 5	Bit 4	Bit 3	Bit 2	Bit 1	Bit 0	Bit 7	Bit 6	Bit 5	Bit 4	Bit 3	Bit 2	Bit 1	Bit 0	Bit 7	Bit 6	Bit 5	Bit 4	Bit 3	Bit 2	Bit 1	Bit 0	Bit 7	Bit 6	Bit 5	Bit 4	Bit 3	Bit 2	Bit 1	Bit 0
VZ	2^7	2^6	2^5	2^4	2^3	2^2	2^1	2^0	2^{-1}	2^{-2}	2^{-3}	2^{-4}	2^{-5}	2^{-6}	2^{-7}	2^{-8}	2^{-9}	2^{-10}	2^{-11}	2^{-12}	2^{-13}	2^{-14}	2^{-15}	2^{-16}	2^{-17}	2^{-18}	2^{-19}	2^{-20}	2^{-21}	2^{-22}	2^{-23}
Sign Bit	Exponent							Significant								Significant								Significant							

$$\text{Value} = (-1)^{VZ} \bullet 2^{(\text{Exponent} - 127)} \bullet (1 + \text{Significant})$$

Fig. 31: Data format of the measured value

Coding of the status byte associated with the PA output value

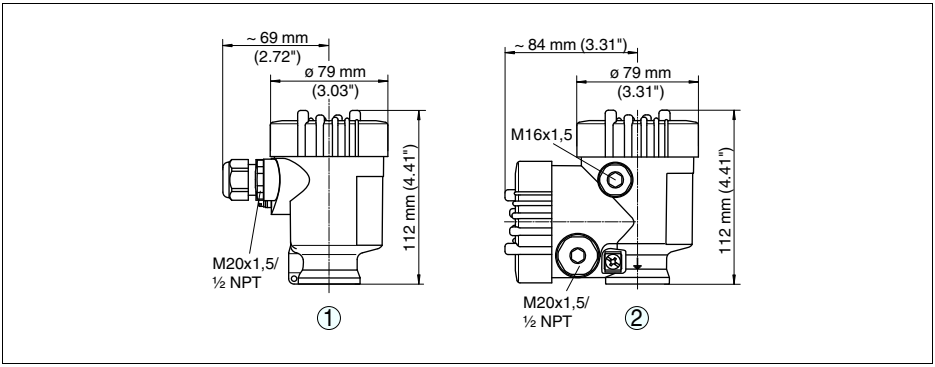
Status code	Description according to Profibus standard	Possible cause
0x00	bad - non-specific	Flash-Update active
0x04	bad - configuration error	• Adjustment error • Configuration error with PV-Scale (PV-Span too small) • Unit irregularity • Error in the linearization table

Status code	Description according to Profibus standard	Possible cause
0x0C	bad - sensor failure	● Hardware error ● Converter error ● Leakage pulse error ● Trigger error
0x10	bad - sensor failure	● Measured value generation error
0x1f	bad - out of service constant	"Out of Service" mode switched on
0x44	uncertain - last unstable value	Failsafe replacement value (Failsafe-Mode = "Last value" and already valid measured value since switching on)
0x48	uncertain substitute set	● Switch on simulation ● Failsafe replacement value (Failsafe-Mode = "Fsafe value")
0x4c	uncertain - initial value	Failsafe replacement value (Failsafe-Mode = "Last valid value" and no valid measured value since switching on)
0x51	uncertain - sensor; conversion not accurate - low limited	Sensor value < lower limit
0x52	uncertain - sensor; conversion not accurate - high limited	Sensor value > upper limit
0x80	good (non-cascade) - OK	OK
0x84	good (non-cascade) - active block alarm	Static revision (FB, TB) changed (10 sec. active, after the parameter of the static category has been written)
0x89	good (non-cascade) - active advisory alarm - low limited	Lo-Alarm
0x8a	good (non-cascade) - active advisory alarm - high limited	Hi-Alarm
0x8d	good (non-cascade) - active critical alarm - low limited	Lo-Lo-Alarm
0x8e	good (non-cascade) - active critical alarm - high limited	Hi-Hi-Alarm

10.3 Dimensions

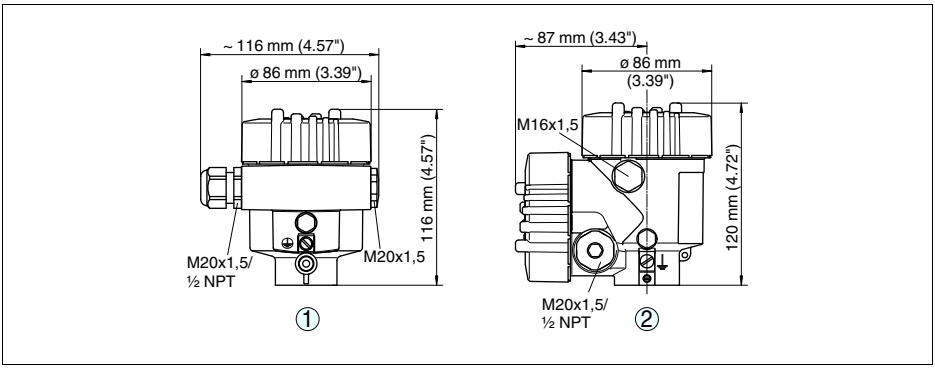
The following dimensional drawings represent only an extract of the possible versions. Detailed dimensional drawings can be downloaded on www.vega.com under "*Downloads*" and "*Drawings*".

Plastic housing



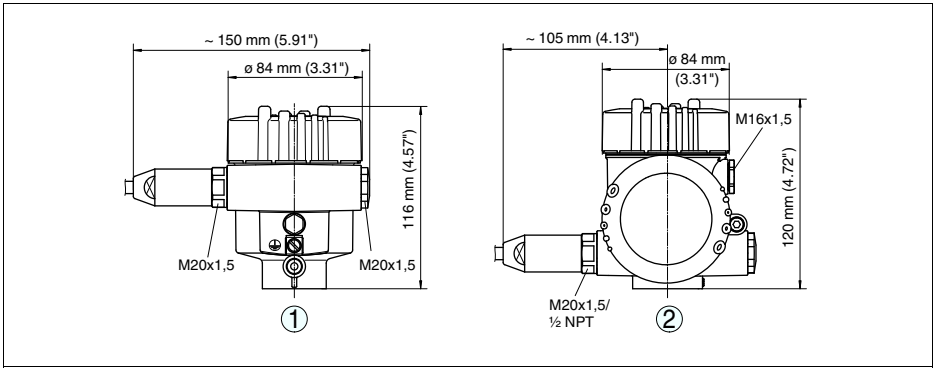
1 Single chamber version
2 Double chamber version

Aluminium housing



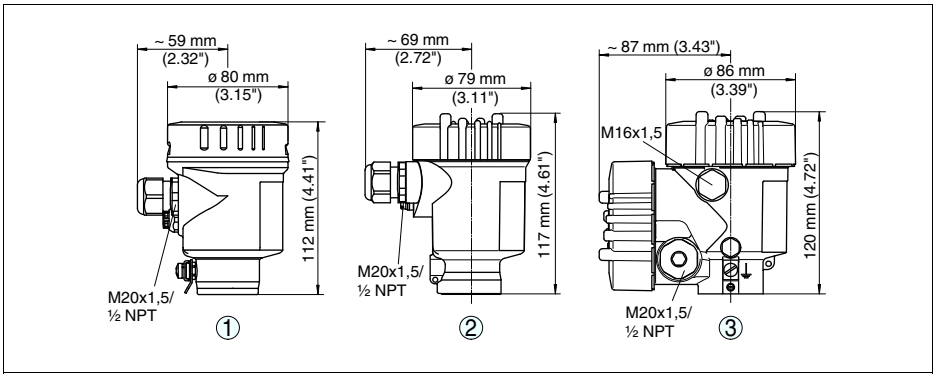
1 Single chamber version
2 Double chamber version

Aluminium housing in protection rating IP 66/IP 68, 1 bar



1 Single chamber version
2 Double chamber version

Stainless steel housing



1 Single chamber version, electropolished
2 Single chamber version, precision casting
2 Double chamber version, precision casting

VEGAFLEX 67, rod, cable version (-200 … +400 °C/-328 … +752 °F)

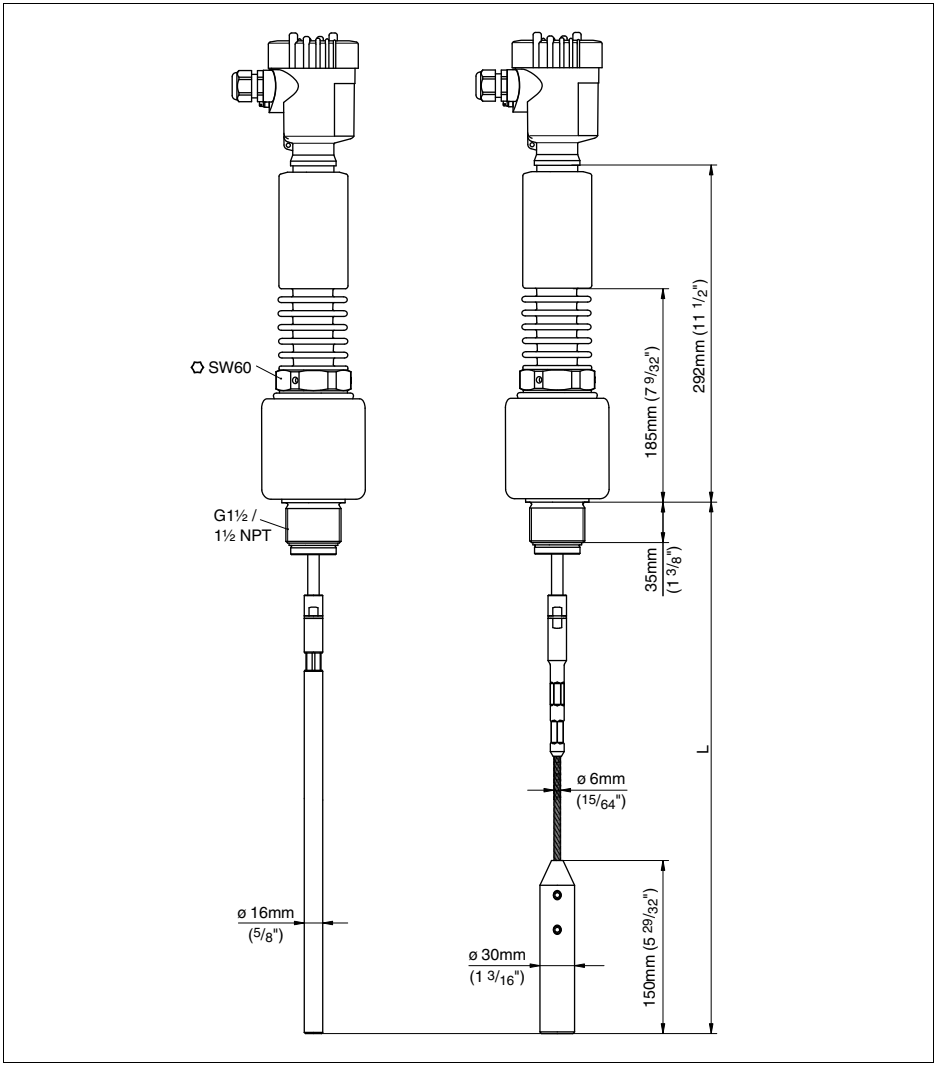


Fig. 36: VEGAFLEX 67, cable, rod version with thread (-200 … +400 °C/-328 … +752 °F)

L Sensor length, see chapter "Technical data"

VEGAFLEX 67, coax version (-200 … +400 °C/-328 … +752 °F)

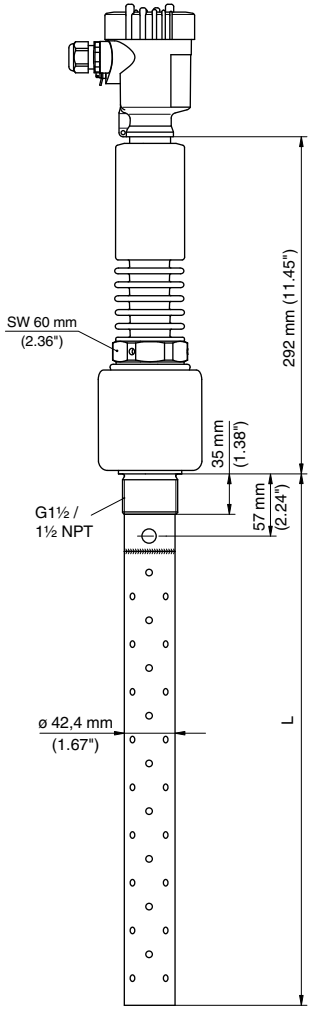


Fig. 37: VEGAFLEX 67, coax version with thread (-200 … +400 °C/-328 … +752 °F)

L Sensor length, see chapter "Technical data"

10.4 Industrial property rights

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